Remarks

This amendment is responsive to the Office communication mailed April 6, 2005. Unless otherwise indicated, page and paragraph references are to that communication.

Applicants have amended the preambles of each of the independent claims to recite that the physical machine "contains" (rather than "comprises") one or more logical partitions. This change has been made so that the preambles of each of these claims will contain only one instance of the word "comprising", thereby clearly signaling the transition between the preamble and the body of the claims. No substantive change is intended.

The following remarks are directed to specific groups of claims remaining in the application.

Claims 4-15

Claims 4-15 recite that if the actual consumption of resources by a logical partition exceeds the maximum allowed consumption, the actual consumption is reduced to the maximum allowed consumption by reducing the defined portion of machine resources allocated to the logical partition while allowing the software applications executing in the logical partition to continue executing.

Claims 4-15, like the other remaining claims, stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent 6,438,704 to Harris et al. ("Harris") in view of U.S. Patent 6,032,239 to Beelitz ("Beelitz") (page 2, ¶ 3). This rejection is respectfully traversed.

Harris relates to a system and method for scheduling use of system resources among a plurality of users. A share of processor time is specified for each user, and a particular user's CPU usage is limited to an absolute value in a "dispatch driven" multiprocessing system that is described in further detail in the patent. Among the mechanisms used by Harris is a "limit list" 27 (Fig. 1) of users whose CPU resource must be limited so that their consumption does not exceed a limit value; such users are said to have a "limit status" (col. 4, lines 9-12). Users on the limit list may

be removed from the list and transferred to a dispatch list 37 (Fig. 1) to restore them to "dispatch status" when resources become available, as in low-load situations (col. 4, lines 12-16).

Beelitz, cited previously, relates to a system and method for updating partition mappings to logical drives in a computer memory device.

The Examiner contends that while Harris does not teach the use of different partitions, Beelitz teaches the use of different partitions with different resources "for upgrading, adding, deleting or changing the partition or resources on an exiting hard drive" (page 3, ¶ 5). The Examiner concludes that it would have been obvious to combine the teachings of the two "because Beelitz's system of having changeable partitions would improve the efficiency of Harris' system by eliminating the particular partition that has hit its permitted consumption before it bogs down the entire system" (page 3, ¶ 6). Applicants respectfully disagree.

As a threshold matter, while Beelitz relates to partitions, the partitions in question are those of a hard drive (Fig. 1: 16), where applications may reside before being loaded into main memory and executed. This has nothing to do with the partitioning of the physical machine (i.e., the CPU and related resources) on which the applications are actually executed. Beelitz thus does not disclose a physical machine comprising one or more logical partitions, each of which is allocated a defined portion of machine resources "and has one or more software applications executing therein" as claimed by applicants.

Of course, machines that are partitioned in the sense claimed by applicant exist in the prior art; applicants refer to several such machines in the background part of the specification, on page 2 at lines 8-14. However, even if one were to combine these teachings with those of Harris, one would still not have applicants' claimed invention.

From the Examiner's characterization of applicant's invention and Harris, it would seem that applicants' invention is nothing more than the system of Harris, but applied to a partitioned system. This is simply not so. In Harris, the resource consumption that is being managed is the consumption of machine resources (in particular, CPU time) by individual users. In applicants'

claimed invention, it is <u>the logical partition itself</u> whose resource consumption is being measured and held to a maximum allowed consumption. Consumption of resources by <u>individual users</u> is irrelevant to this exercise unless, of course, that consumption pushes the total consumption for the partition over the limit.

Nothing in either Harris or the art relating to logical partitioning would suggest applying the monitoring techniques of Harris to a partition as whole rather than to an individual user running in that partition. This is particularly evident when one considers the motivation present in the two cases. In Harris, CPU usage by a particular user is limited in order to provide a "fair" amount of CPU time to other users competing for the same total CPU time (col. 1, lines 36-42). That is to say, Harris is seeking to manage the <u>relative</u> consumption of CPU resources by different users rather than the <u>total</u> CPU resource consumption. In applicants' system, on the other hand, the total resource consumption by a particular partition is limited in order to accommodate software licensing schemes[1] that base the licensing fee on the total capacity available to the partition rather than the capacity actually used by the application (page 5, lines 4-28). Nothing in either of the references cited by the Examiner teaches managing the actual consumption of resources by <u>a logical partition</u>, as distinguished from individual users in a partition, in the manner claimed by applicants.

Accordingly, claims 4-15 as amended distinguish patentably over the combination of these two references.

Claims 16-24

Claims 16-24 recite that if the actual average consumption of resources by a logical partition exceeds a maximum average consumption, the actual average consumption is reduced to the maximum average consumption by alternatingly operating the logical partition in a capped mode in which the logical partition is limited to a maximum capped consumption and in an uncapped mode in which the logical partition is not limited to the maximum capped consumption.

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[1] Applicants' claims, to be sure, do not recite the use of such a software licensing scheme. Whether or not recited in applicants' claims, however, the actual motivation for applicants' claimed invention is relevant to the issue of obviousness.

Claims 16-24 likewise stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Harris in view of Beelitz (page 2, ¶ 3). This rejection is likewise traversed.

In applying Harris, the Examiner is apparently equating being on the limit list 27 (Fig. 1) with applicants' capped mode and coming off the limit list with applicants' claimed uncapped mode of operation. This comparison is misplaced for several reasons.

First of all, as a general proposition, Harris is inapposite to applicants' claimed invention for the reasons given above, since it relates to controlling resource consumption by individual users, whereas applicants seek to control resource consumption by a logical partition, which may contain many such users. Nothing in either of the references cites suggests the desirability of controlling resource consumption by an entire logical partition.

Furthermore, Harris does not control the resource consumption of even individual users in the manner claimed by applicants for logical partitions. In applicants' claimed system, the logical partition is alternatingly operated in a capped mode in which it is limited to a maximum capped consumption (which is less than the maximum average consumption) and in an uncapped mode in which it is not limited to the maximum capped consumption, as shown in Fig. 2A. In either mode of operation, the partition continues to operate; it simply gets fewer (and capped) resources in capped mode than it does in uncapped mode. This contrasts with Harris' operation, in which "hard limit" users that have exceeded their limit are simply moved to the limit list and not run at all until their resource consumption comes within acceptable bounds (col. 2, lines 36-38). While this may be an acceptable mode of operation for individual users in the Harris system, it would not be an acceptable manner of controlling usage by an entire partition, since it would mean that no user would be able to run until the partition moved off the limit list.

Accordingly, Claims 16-24 distinguish patentably over the art cited by the Examiner.

Claims 25-27

Each of these claims recites that the logical partition is one of a group of partitions, each of which is assigned a weight, that the maximum capped consumption is specified as a proportion of the resources available to the group of partitions, and that the proportion is defined as the ratio of the weight of the logical partition to the sum of the weights of the partitions in the group. Additionally, the logical partition is assigned a phantom weight that is added to the sum of the weights of the logical partitions in the group but not to the weight of the partition itself in determining that ratio.

Similar recitations are contained in claims 8 and 15 of the first group above, as well as claims 19 and 24 of the second group above.

Claims 25-27 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Harris in view of Beelitz (page 2, ¶ 3). Like the other rejections, this is respectfully traversed.

Since claims 25-27 incorporate the salient limitations of claims 4-24, they are believed to distinguish patentably over the references cited for the same reasons as those earlier claims. They are additionally believed to distinguish patentably over the references cited by virtue of their recitations relating to phantom weight.

The Examiner takes official notice that uses of weights within partitions are "well known in the art" (page 4, ¶ 9). Such weights, however, are used to apportion CPU time or other system resources among various resource users on an unequally weighted basis. In a well-known manner, when determining the relative weight accorded to a given user, one divides the absolute weight assigned to that user by the sum of the absolute weights assigned to all users. In such a scenario, since each term in the denominator represents the weight of a particular user, the sum of the relative weights accorded to all users is by definition 100%. For example, if three users had absolute weights of 1, 2 and 5, their relative weights would be 12.5%, 25% and 67.5%, for a total of 100%.

This is not what happens, though, when assigning a <u>phantom</u> weight to a partition. The phantom weight does not represent the weight of the partition in question or any other partition, but is merely added to the denominator to reduce the relative weight of the partition. This concept of phantom weighting can even be applied when the machine in question has only a single logical partition; indeed, the concept is especially useful here, since otherwise there would be no ready mechanism for reducing the resource consumption by that partition to a specified maximum (page 14, lines 22-29).

Thus, while there is considerable art on weighting generally, the Examiner can point to no art teaching the concept of a phantom weight, which is added to the sum of the partition weights in the denominator but does <u>not</u> represent the weight of any actual partition and thus is not added to the weight of the partition itself in the numerator to determine the ratio of the partition weight to the total weight. Accordingly, claims 8 and 25-27 distinguish patentably over the cited art by virtue of this claimed feature, as well as for the reasons urged above with respect to claims 4-15.
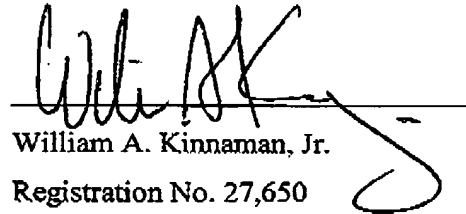
Conclusion

For the foregoing reasons, claims 4-27 as amended are believed to distinguish patentably over the art cited by the Examiner. Entry of this amendment and reconsideration of the application as amended are respectfully requested. It is hoped that upon such consideration the Examiner will hold all claims allowable and pass the case to issue at an early date. Such action is earnestly solicited.

Respectfully submitted,

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